REMARKS

This is in response to the Office Action dated August 14, 2009. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

By the above amendments, claims 1-2 have been cancelled and replaced with new claims 3-6. Support for the new claims can be found at least in Fig. 1 and page 8, line 14 to page 9, line 23 of the specification as originally filed.

Note that the corresponding Japanese application has issued as Japanese Patent No. 3886467. New independent claim 3 includes all of the limitations of the allowed claim in the Japanese application.

1. Drawing Objections

On page 3 of the Office Action, the Examiner indicates that Fig. 3 should be designated by the legend -- Prior Art -- and not Fig. 1. The Examiner is correct, and therefore Fig. 1 and Fig. 3 have been amended to correctly label only Fig. 3 as – Prior Art --. Replacement drawing sheets for Figs. 1-3 are submitted herewith.

2. Amendments to the Specification and Abstract

On page 4 of the Office Action, the specification and abstract are objected to based on minor informalities. Accordingly, the specification and abstract have been reviewed and revised in order to make a number of minor clarifying and other editorial amendments. To facilitate entry of the changes, a substitute specification and abstract has been prepared. No new matter has been added. Also enclosed is a "marked-up" copy of the original specification and abstract to show the changes that have been incorporated into the substitute specification and abstract. The enclosed copy is entitled "Version with Markings to Show Changes Made."

Note, the informalities identified by the Examiner have been addressed in the substitute specification. Also, the substitute abstract provides a more comprehensive description of the subjection matter covered by the disclosure.

3. Title of the Invention

The title of the invention has been amended to more clearly indicate the invention to which the claims are directed.

4. Rejection under 35 U.S.C. 112

On page 5 of the Office Action, claims 1-2 are rejected under 35 U.S.C. 112, second paragraph. As noted above, original claims 1-2 have been cancelled. The new claims clearly indicate that the surface being renewed is that of the raw material.

5. Rejection under 35 U.S.C. 102(b)

On pages 7-8 of the Office Action, claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by De Haven et al. (U.S. Patent No. 3,070,836), Loomans (U.S. Patent No. 4,752,135), Dienst (U.S. Patent No. 4,940,329), Weber (U.S. Patent No. 4,103,355) or Nonaka (U.S. Patent No. 4,100,244). It is submitted that the present invention, as embodied by the new claims, now clearly distinguishes over the applied prior art references for the following reasons.

The present invention is directed to a screw-type kneading/extruding machine including screw pieces 10 composed of one of: feed type kneading screw pieces, twist kneading screw pieces, rotary screw pieces and cut-flight screw pieces.

Independent claim 3, requires, *inter alia*, a screw having an intermediate section (the left end shown in Fig. 1) to a downstream end portion (distal end portion: the right end in Fig. 1) that is composed of an agitating portion 6, a kneading/transporting portion 7, and a plurality of screw pieces 10 with surface-renewing ability. The screw pieces perform an agitating function, and the position of the screw pieces corresponds to a vent opening 4 provided in the cylinder 2 such that the screw pieces are located within an axial length range of the vent opening.

Dienst (US 4,940,329) discloses a screw extruder having a kneading portion (discs) 5 disposed over a vent zone 4 (over 100% of its axial length). Circular spacer discs 6 are disposed between the adjacent discs 5. The discs 5 and the spacer discs 6 of Dienst form a construction that is fundamentally different in structure and function from the screw pieces 10 of the present invention. Also, there is no disclosure of the kneading portion 5 providing a feed function.

In the present invention, the screw pieces 10 with surface-renewing ability are disposed "within" an axial length range of the vent opening (10 to 100% with respect to an axial opening length of the vent opening 4).

Further, as shown in Figs. 1 and 2 of the Dienst reference, only the kneading portion (discs) 5 is disposed at the vent portion 4, and therefore a devolatilization process will suddenly

occur at the vent portion 4 and an entrainment phenomenon (resin is expelled with a gas from the vent portion 4) or a vent-up of resin will occur at the vent portion 4.

Further, Dienst clearly lacks the agitating portion 6 of the present invention as defined in claim 3. Also, the kneading portion 5 does not have a transporting function, and therefore stoppage of the resin can easily be caused at the vent portion 4. Accordingly, with the Dienst apparatus, entrainment and vent-up phenomenons are likely to occur.

In the present invention, the resin material melts or reaches a high temperature in the agitating portion 6. Then the resin material is transported to the vent opening 4 at a low temperature so as to maintain a low devolatilization process for removing the volatile components of the resin material.

Further, the remaining volatile components are removed by the screw pieces 10, and therefore, the present invention is able to protect against entrainment and vent-up of the resin material because the screw pieces 10 are located in a range of 10 - 100% of the axial length of the vent opening 4. However, if the screw pieces 10 extend over 100% of the vent opening 4, entrainment and vent-up are much more likely to occur.

Weber (US 4,103,355) discloses a mixing extruder including a shut-off device 5 at the end of a mixing chamber 3 followed in feeding direction by a storing zone 7 which in turn is followed by an ejecting zone 8. The storing zone 7 is provided with a pocket 9 equipped with a connection 10 for a vacuum pump 10a, which is provided for degasifying the material in the storing zone 7. The feeding of the extruder is effected through the intervention of a charging chute 13 equipped with a stuffing or pushing device 6. As the device 6 presses material into the mixing chamber 3, the shut-off device 5 is closed, and the material is subjected to an intensive intermixing process. After the mixing operation has been completed, the shut-off device 5 is opened, and a worm part of the mixing chamber 3 feeds the material into the storing zone 7. In the Weber construction, melted resin material is transported from a high pressure portion to a low pressure portion; and therefore, a significant devolatilization phenomenon will be caused. Further, the screw 4 is disposed completely over and beyond the vent opening 9 (i.e. over 100% of the length), and thus melted resin will stay in the vent zone, and entrainment and vent-up may be caused.

Clearly, the Weber device lacks screw pieces located within the range of the axial lenth of the vent opening, as set forth in claim 3. Therefore, Weber cannot anticipate claim 3 under 35 U.S.C. 102(b). Note, in the constructions of Dienst and Weber, the devolatilization process could not be performed if a kneading function were added at the vent portions.

Further, with regard to the **Loomans** (US 4,752,135) and **Nonaka** (US 4,100,244) references, the length of the screw pieces at the vent portions are longer than the length of the vent portion, i.e., they are over 100% of the vent portion/zone; and therefore, these constructions clearly do not disclose Applicant's invention as defined in claim 3.

De Haven (US 3,070,836) discloses an extruder having a screw piece 47 for carry forward hot material, kneading and constantly exposing new surfaces for the release of volatiles. As shown in Fig. 1, a portion of the screw piece 47 is positioned upstream of the vent opening 45. Clearly, the screw piece 47 is not located within the axial length range of the vent opening as required in claim 3, and therefore, the De Haven patent cannot anticipate claim 1 under 35 U.S.C. 102(b).

In view of the above, it is submitted that the present application is now clearly in condition for allowance. The Examiner therefore is requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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